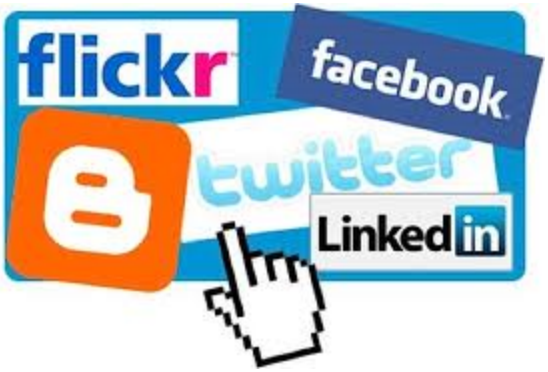
CMSC 110
Introduction to Computing

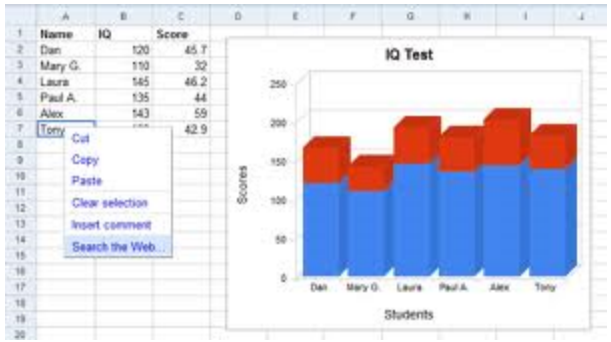
Eric Eaton

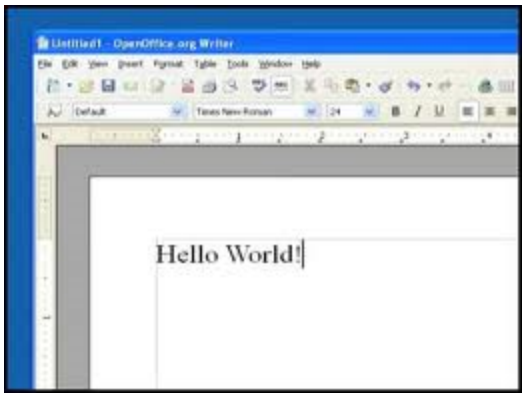
What is Computing?

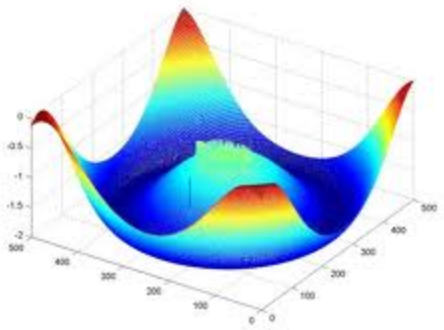
Computing: internet, e-mail, network…

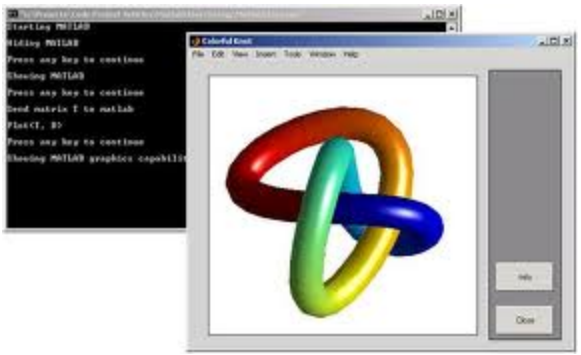


Computing: Productivity…









Computing: Digital Photography

Computing: Digital Photography

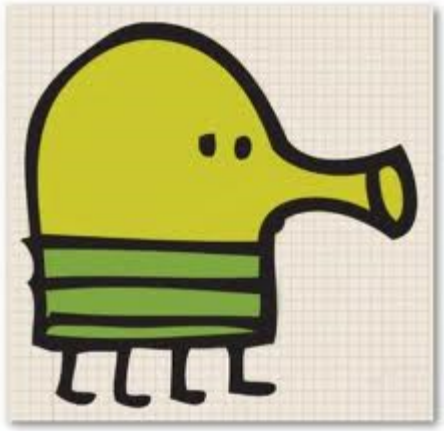
http://www.alanzeyes.com/2009/02/hdr-photography.html

Computing: Entertainment…

YouTube

NETFLIX®

Computing: Entertainment…

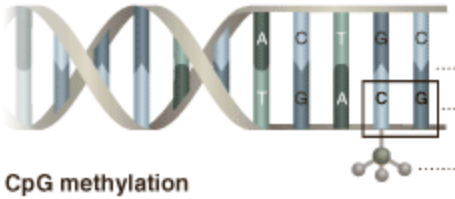


“Computer science is no more about computers than astronomy is about telescopes”

- Edsger Dijkstra

Mapping the Epigenome

DNA contains the genetic blueprint for all human cells, but the reading and execution of the blueprint inside each cell is controlled in part by chemical markers attached to the DNA. Scientists have begun to map some of these epigenetic markers, including CpG methylation.



CpG methylation

DNA is a code written with four letters: **A**, **T**, **C** and **G**, each standing for one nucleotide.

In CpG methylation, a small marker called a methyl group attaches to the DNA at a CpG site, where a **C** and a **G** nucelotide sit next to each other.

Reading the ch

The outer ring r
Orange marks l
CpG methylatic

1 million base pairs

MUSCLE
LIVER
HEART
WHITE BLOOD CELL
SKIN
PLACENTA
SPERM

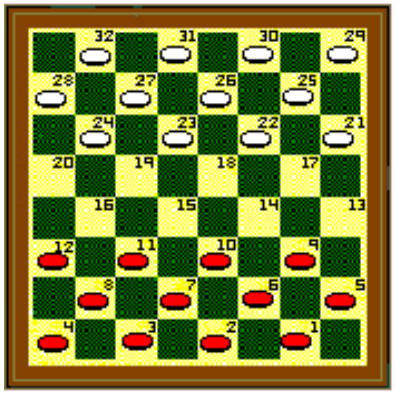
Chromosome 22

Of the 23 pairs of chromosomes in the human genome, 22 is the second smallest, containing only about 2

Gray and white bands on the circular chart correspond to

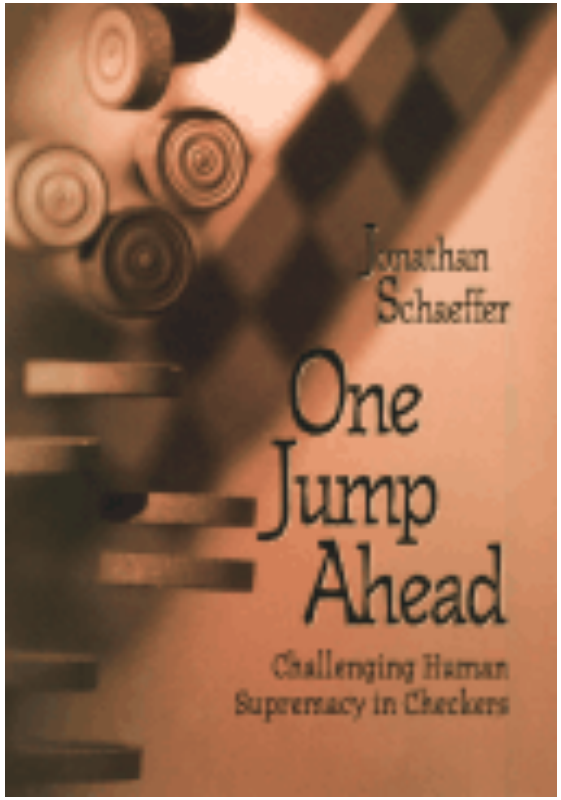
Chinook

The board set for play

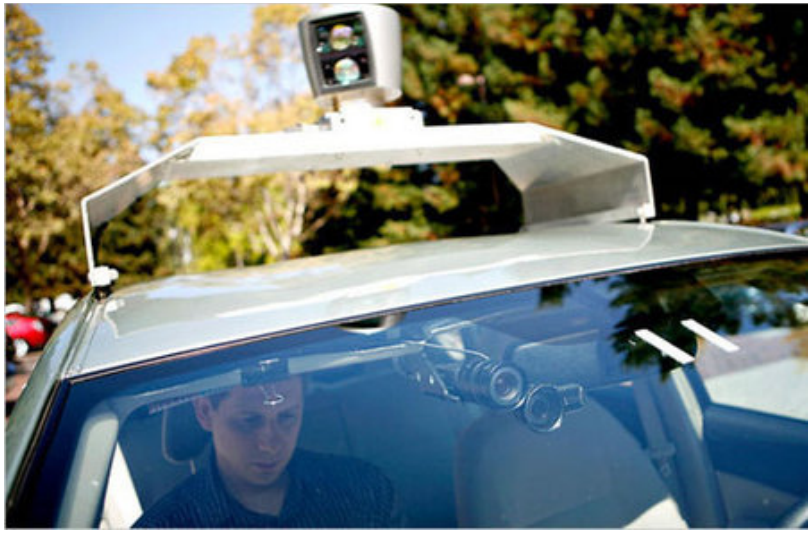


Red to play

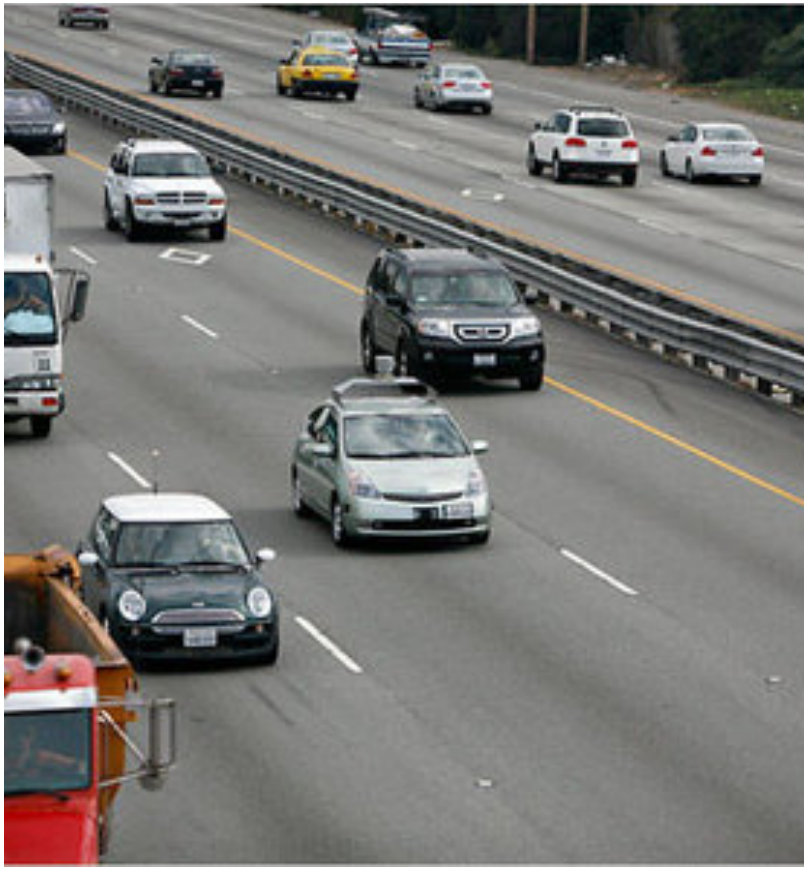
- Chinook is the World Man-Machine Checkers Champion, developed by researchers at the University of Alberta.
- It earned this title by competing in human tournaments, winning the right to play for the (human) world championship, and eventually defeating the best players in the world.
- Visit http://www.cs.ualberta.ca/~chinook/ to play a version of Chinook over the Internet.
- The developers have fully analyzed the game of checkers and have the complete game tree for it.
  - Perfect play on both sides results in a tie.
- "One Jump Ahead: Challenging Human Supremacy in Checkers" Jonathan Schaeffer, University of Alberta (496 pages, Springer. $34.95, 1998).



Google's Autonomous Car



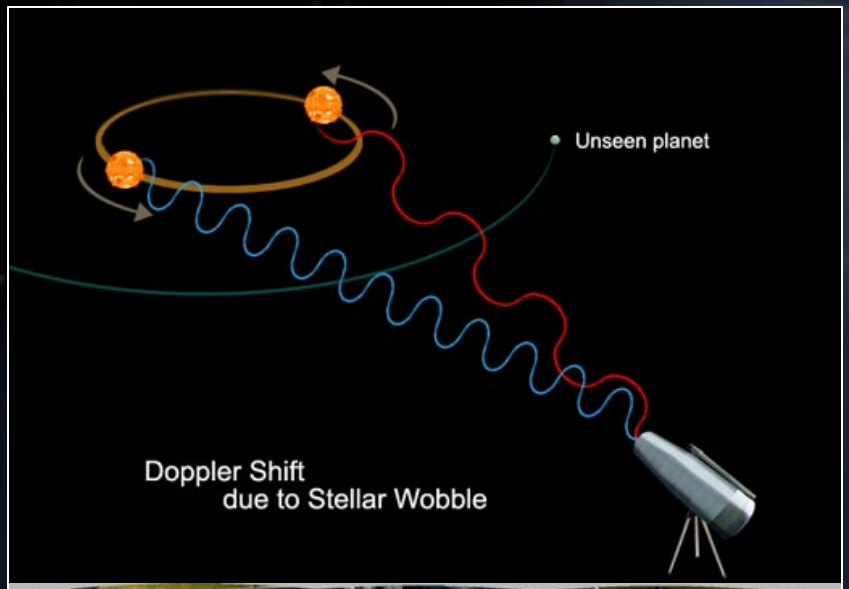
- Nevada made it legal for autonomous cars to drive on roads in June 2011

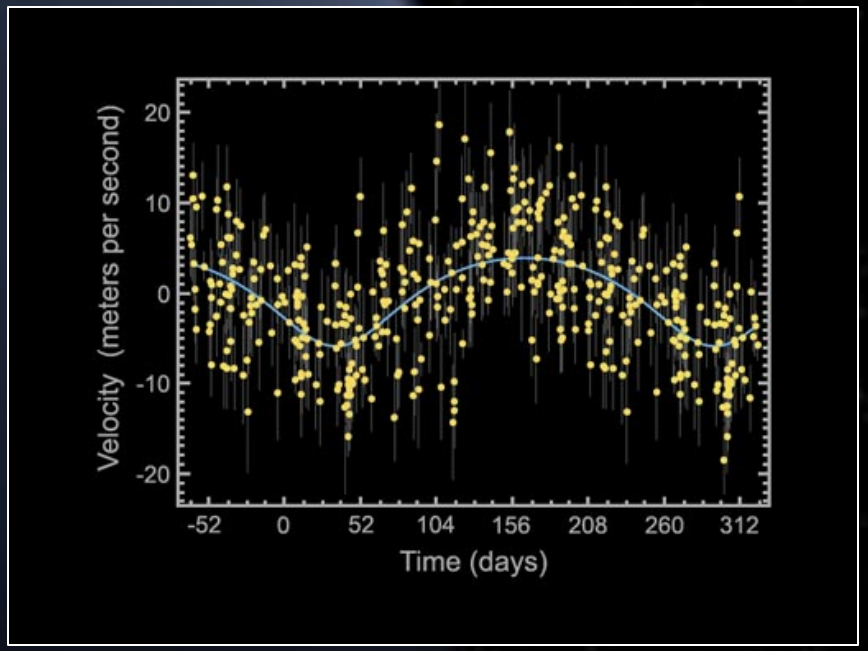


2011 Jeopardy!

- In February 2011, IBM Watson bested Brad Rutter (biggest all-time money winner) and Ken Jennings (longest winning streak)
- IBM is currently applying Watson's technology to medical diagnosis and legal research

Finding Life-Supporting Planets





ART

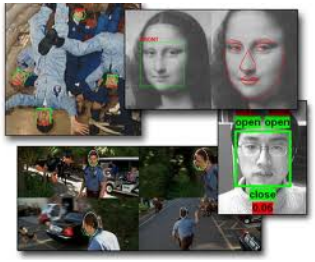
Protobytes
By Ira Greenberg

Areas in Computer Science

Operating Systems

Computer Networking

Computer Graphics



Computer Vision

Databases

Computer Security

Artificial Intelligence

Robotics

Human-Computer Interaction

Ubiquitous Computing

What is Computer Science?

Simple definition: Computer science is the study of solving problems using computation

- Computers are part of it, but the emphasis is on the problem solving aspect

Computer scientists work across disciplines:

Mathematics	Geoscience	Medicine/Surgery
Biology (bioinformatics)	Archeology	Engineering
Chemistry	Psychology	Linguistics
Physics	Sociology	Artists
Geology	Cognitive Science	…

Computing is important.

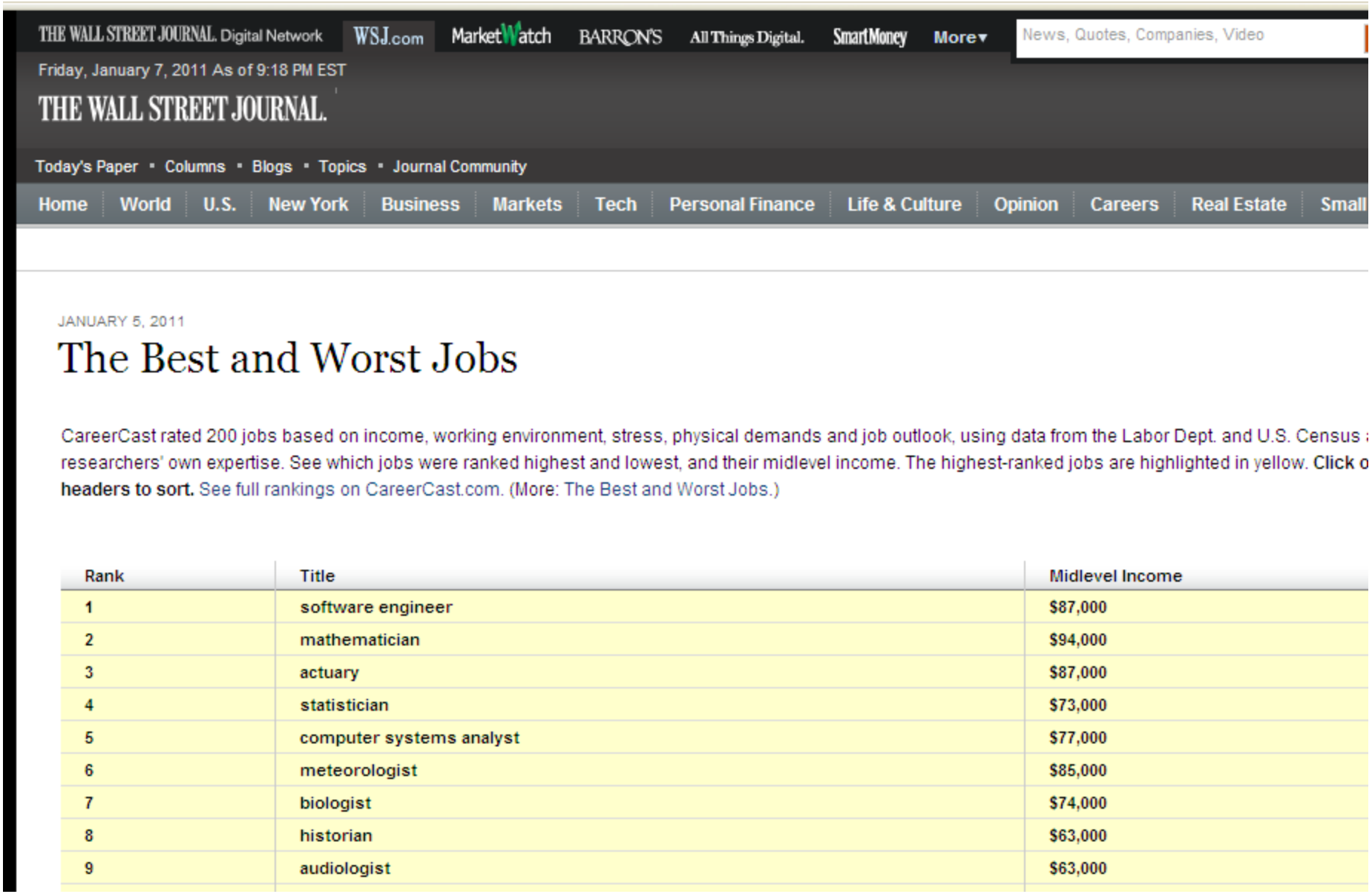
Fastest Growing Occupations

Table 1.3 Fastest growing occupations, 2008 and projected 2018
(Numbers in thousands)

2008 National Employment Matrix title and code	Employment		Change, 2008-18		Median Annual wage quartile, 2008
	2008	2018	Number	Percent	
Network systems and data communications analysts	292.0	447.8	155.8	53.36	VH
Computer software engineers, applications	514.8	689.9	175.1	34.01	VH
Computer software engineers, systems software	394.8	515.0	120.2	30.44	VH

Source: Employment Projections Program, U.S. Department of Labor, U.S. Bureau of Labor Statistics

Occupational Outlook Handbook, 2010-11 Edition, http://www.bls.gov/emp/ep_table_103.htm



http://online.wsj.com/public/resources/documents/st_BESTJOBS0104_20110105.html

How many of us are studying CS?

United States and Canada

Figure 7. Newly Declared CS/CE Undergraduate Majors

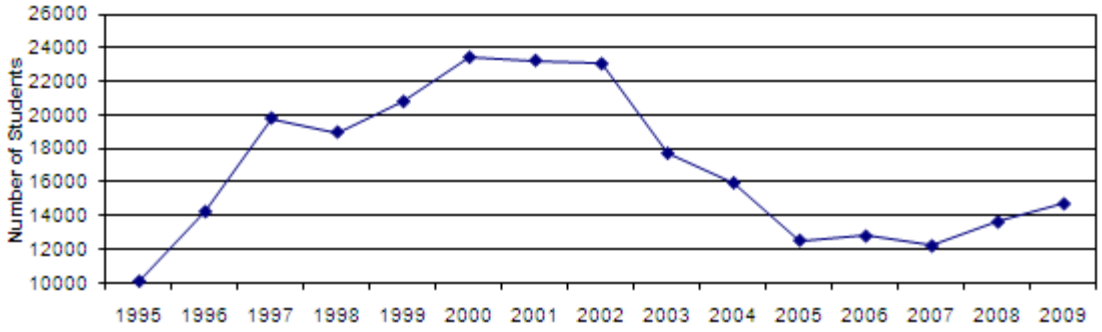
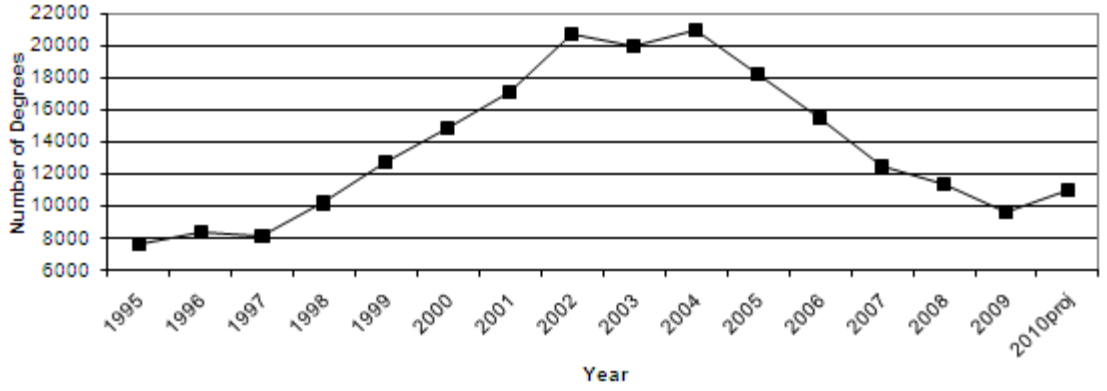


Figure 6. BS Production (CS & CE)



Computing Research News, CRA May 2010 CS=Computer Science, CE=Computer Engineering
http://www.cra.org/resources/taulbee/

We've turned a corner…

- "Stanford University enrollment for in CS106A (CS1) [in 2010/2011] is 1087, which represents a year-on-year growth of 51%"
- Why?
  1. I'm just curious
  2. Increase my potential to land a good job
  3. I love computing
  4. Need to fill a requirement
  5. Other…

http://computinged.wordpress.com/2011/04/13/guest-post-eric-roberts-on-the-dangers-of-escalating-enrollments/

hitects
ım.

Computer science tops list of best major for jobs

BY RACHEL GOTTFRIED

Computer science graduates now get more offers of employment than any other major. This is the first time since 2008 that computer science has topped the list: previously, accounting majors had the highest offer rate.

In 2011, 56.2% of computer science majors received job offers, compared to only 53.8% of accounting majors. The offer rate for computer science majors increased 13.8% this year from the previous year.

Computer science and accounting majors are in high demand because both are needed in a wide range of industries.

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"There are many different companies that need to hire computer scientists," said Mimi Collins, director of communications at the National Association of Colleges and Employers.

"They aren't tied to one particular industry—majors like nursing do not enjoy that benefit."

Although this is good news for computer science grads, it might not be for the computer industry. According to Collins, "One computer science graduate may have 10 offers as opposed to one accounting graduate that's getting five offers." So, computer science majors may be getting more offers, but this is only because there is a shortage of people who graduate with such a degree.

According to Collins, companies like to hire recent graduates because they have the latest skills.

"Things change very quickly, especially in computer science," said Collins. "Many organizations have a formal track where they want to bring in new college graduates and train them the way they want them to be trained."

Annabelle Evans graduated as a computer science major from the University of Southern California in 2008. "When I picked my major, I knew there wouldn't be a lack of jobs as a computer scientist, and that was part of the appeal," she said. Evans now works at Google.

…many different companies … need to hire computer scientists. They aren't tied to one particular industry.

Administrivia

CMSC 110: Introduction to Computing

Fall 2011 – Section 1

Eric Eaton, Ph.D.

Email: eeaton@cs.brynmawr.edu (put CS110 at start of subject line)

Lectures

Tues/Thurs 2:15-3:45 pm in Park 349

Labs

Wed/Thurs 10am-12 pm in Park 231

Grading

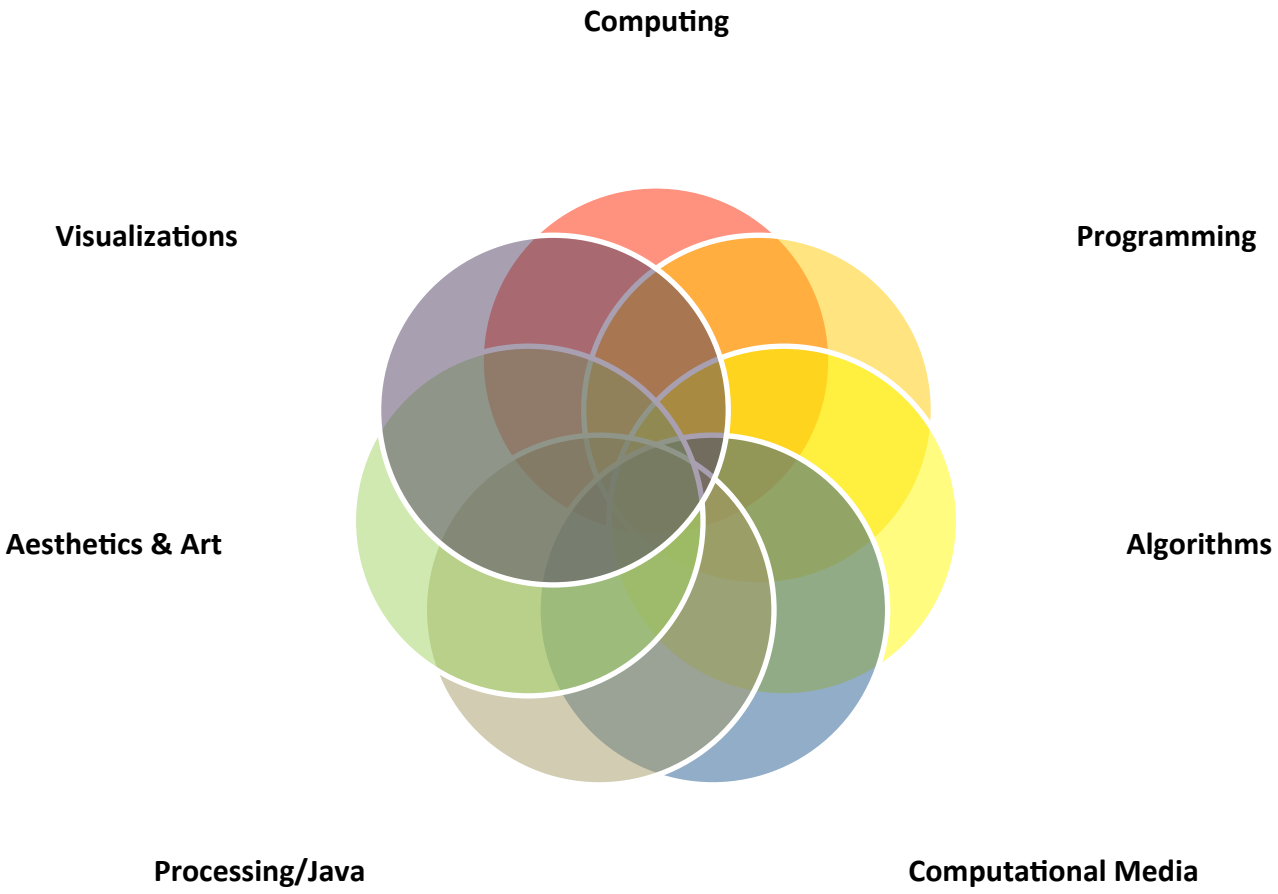
• 7 Assignments	56%
• Exam 1	20%
• Exam 2	24%
Total	100%

Office Hours

Mon/Thurs 1-2 pm and by appointment in Park 249

Introduction to ^ Computing

Creative



Algorithms

An **algorithm** is an effective method for solving a problem expressed as a finite sequence of instructions. For example,

Put on shoes

left sock

right sock

left shoe

right shoe

Programming = Writing Apps

Programming is the process of designing, writing, testing, debugging / troubleshooting, and maintaining the source code of computer programs. This source code is written in a programming language.

A program

```
int areaOfCircle(int radius){
   return PI*radius*radius;
}

r = 10;
area = areaOfCircle(r);
```

Programming Languages

Processing	Python	Lisp

`int areaOfCircle(int radius){`
`  return PI*radius*radius;`
`}`
 	
`r = 10;`
`area = areaOfCircle(r);`
	`def areaOfCircle(radius):`
	`  return PI*radius*radius;`
	
	`r = 10`
	`area = areaOfCircle(r)`
		`(defun areaOfCircle (radius)`
		`  (return (* PI radius radius)))`
		
		`(setq r 10)`
		`(setq area (areaOfCircle r))`

A more interesting program...

```
Eye e1, e2, e3, e4, e5;

void setup()
{
  size(200, 200);
  smooth();
  noStroke();
  e1 = new Eye( 50,  16,  80);
  e2 = new Eye( 64,  85,  40);
  e3 = new Eye( 90, 200, 120);
  e4 = new Eye(150,  44,  40);
  e5 = new Eye(175, 120,  80);
}

void draw()
{
  background(102);

  e1.update(mouseX, mouseY);
  e2.update(mouseX, mouseY);
  e3.update(mouseX, mouseY);
  e4.update(mouseX, mouseY);
  e5.update(mouseX, mouseY);

  e1.display();
  e2.display();
  e3.display();
  e4.display();
  e5.display();
}
```

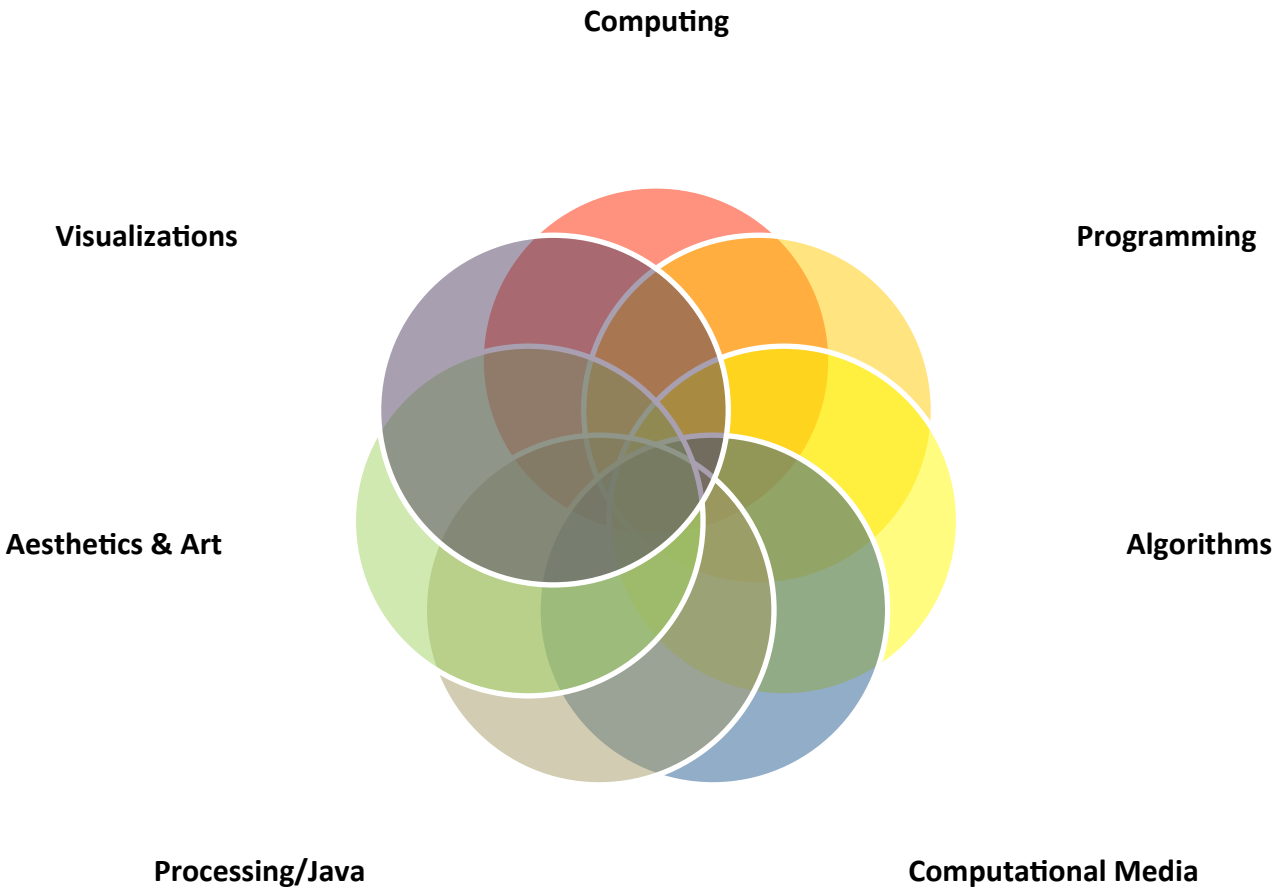
```
class Eye
{
  int ex, ey;
  int size;
  float angle = 0.0;

  Eye(int x, int y, int s) {
    ex = x;
    ey = y;
    size = s;
  }

  void update(int mx, int my) {
    angle = atan2(my-ey, mx-ex);
  }

  void display() {
    pushMatrix();
    translate(ex, ey);
    fill(255);
    ellipse(0, 0, size, size);
    rotate(angle);
    fill(153);
    ellipse(size/4, 0, size/2, size/2);
    popMatrix();
  }
}
```

Our Goal

- Use computing to realize works of art
- Explore new metaphors from computing: images, animation, interactivity, visualizations
- Learn the basics of computing
- Have fun doing all of the above!

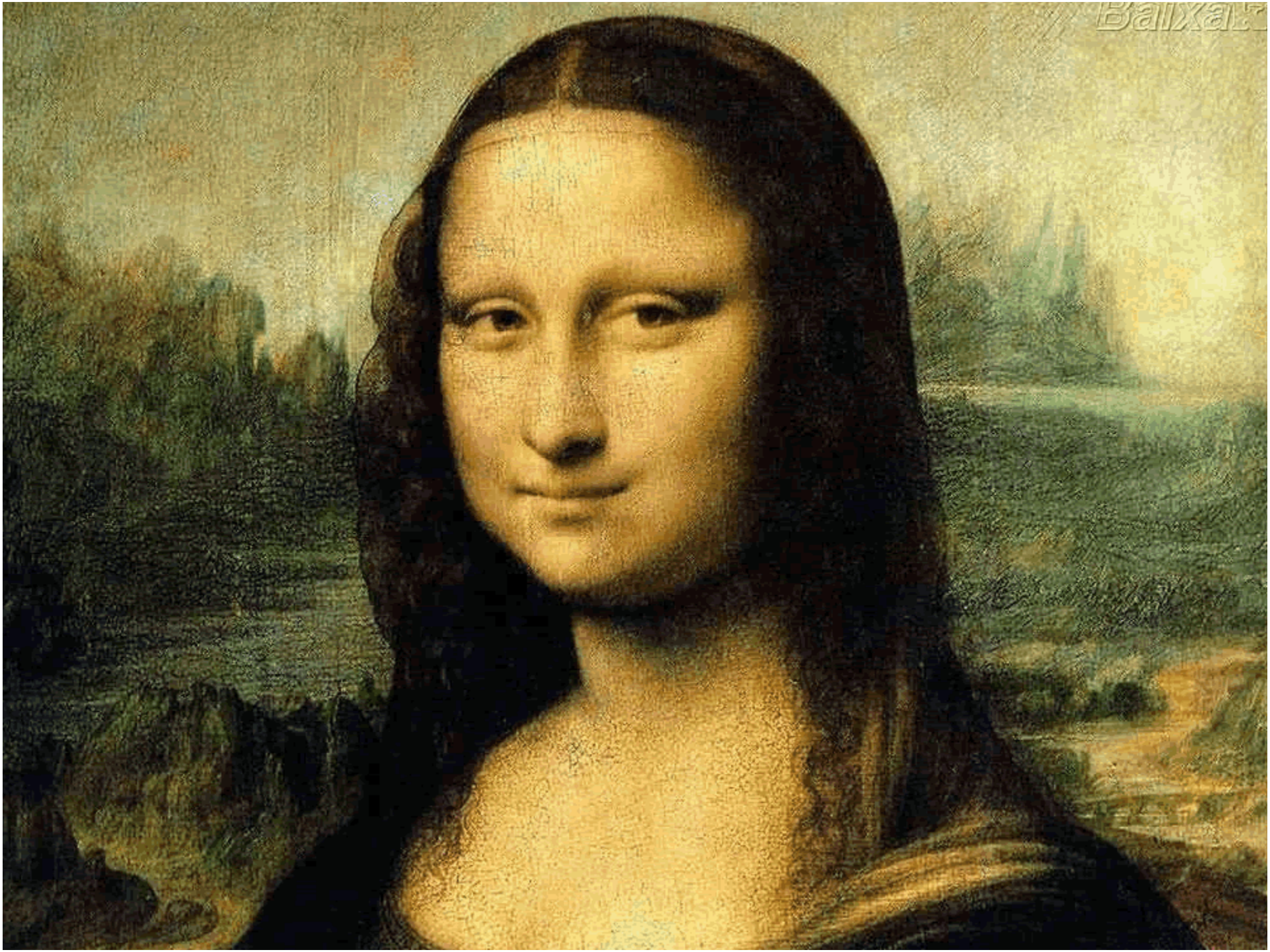
Introduction to ^ Computing

Creative



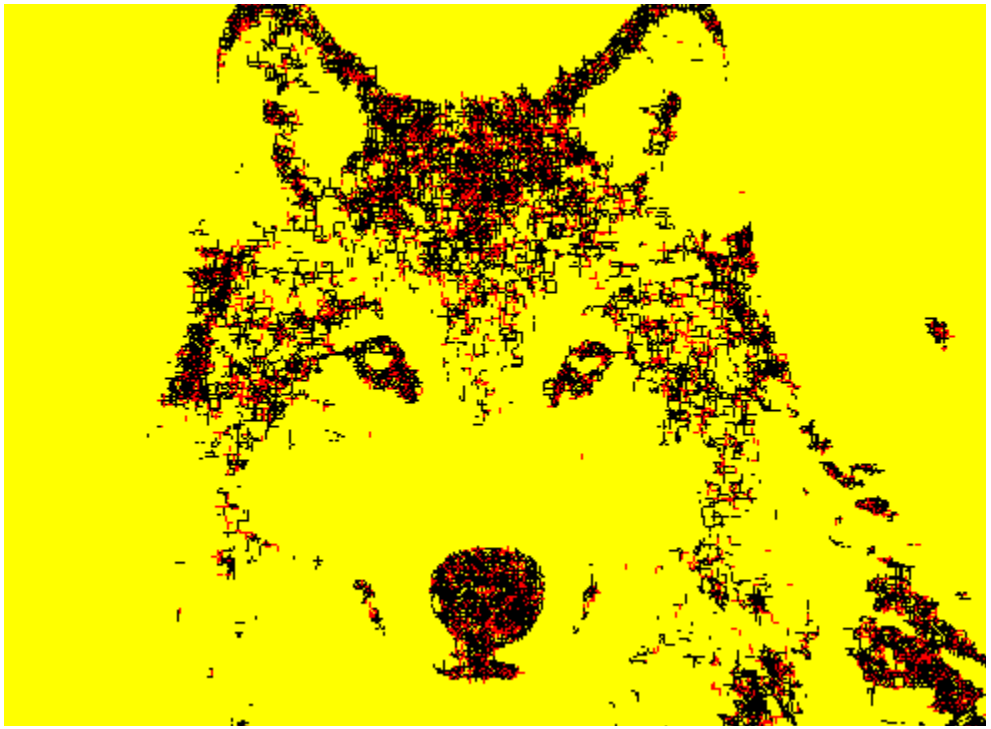
Examples

Shepard Fairey

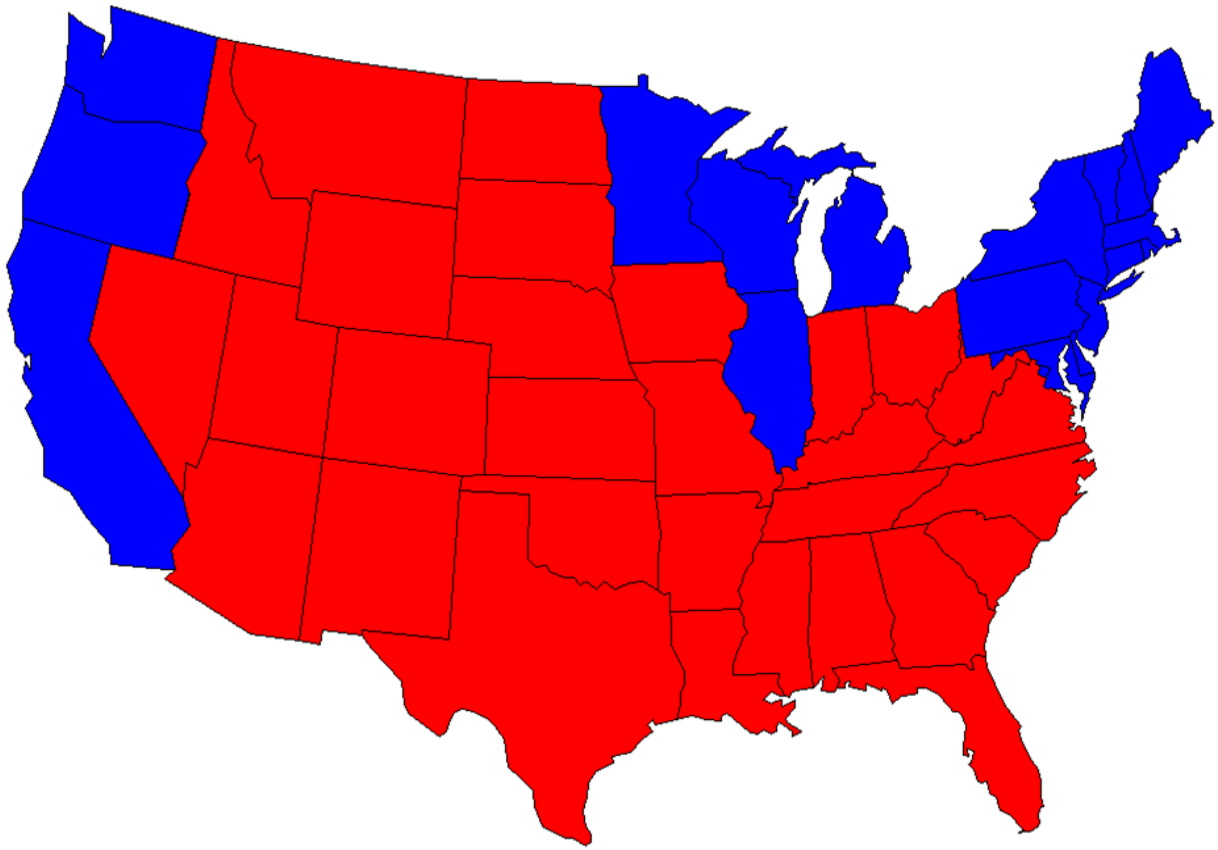



Baikal-1

Abstract Art



Red & Blue States



Summertime

Summertime,
And the livin' is easy
Fish are jumpin'
And the cotton is high

Your daddy's rich
And your mamma's good lookin'
So hush little baby
Don't you cry

One of these mornings
You're going to rise up singing
Then you'll spread your wings
And you'll take to the sky

But till that morning
There's a'nothing can harm you
With daddy and mamma standing by

Summertime,
And the livin' is easy
Fish are jumpin'
And the cotton is high

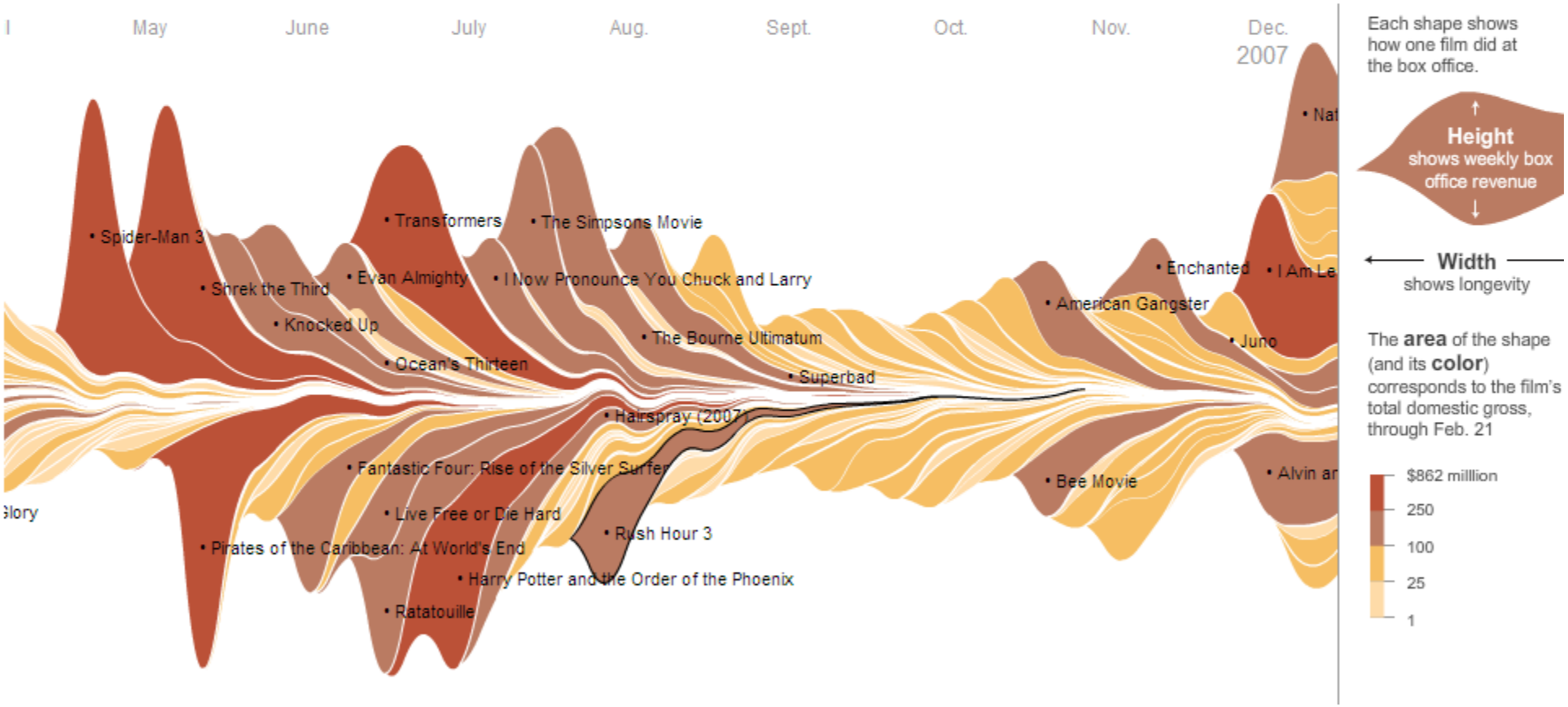
Your daddy's rich
And your mamma's good lookin'
So hush little baby
Don't you cry

Lyrics by George Gershwin

Word Cloud

Created using: wordle.net

Box Office Earnings



From: The Ebb and Flow of Movies: Box Office Receipts 1986 — 2008
nytimes.com
February 23, 2008

Let’s get started…